Focus

Water saving on a gravity-flow irrigation district Challenges and issues on Lis Valley, Portugal

Lis Valley Irrigation District located in the coastal center of Portugal is administered by a users' association which manages the operation and maintenance of the main pumping and water conveyance infrastructures to the plots. As part of a project supported by the agricultural European Innovation Partnership, a study carried out in collaboration with farmers and focusing on the performance of the collective supply network has identified priority courses of action for achieving water savings by reconciling rural development with environmental and economic sustainability.

In consequence of global change, society is urging water savings by irrigated agriculture, through the decrease of water consumption (Harmel et al., 2020). The major challenge is to maintain or increase agricultural production with less water. It requires the adaptation of irrigated agriculture, through a change of technology and practices compatible with the farmers' technical know-how and farms economic sustainability (Perry et al., 2009). This last issue is particularly relevant on collective irrigation districts, because they play a decisive role in worldwide agriculture and namely in the Portuguese case, in ensuring such socio-economic sustainability. The performance of the delivery system is not only assessed for hydraulic effectiveness in water transport; the off-farm conveyance and distribution system should deliver the water according to adequate, reliable, and equitable criteria, which is a precondition for good water management and land productivity (Playán et al., 2018).

Water savings on an irrigation district is a complex and challenging issue because this objective should be reached keeping the irrigated area and possibly increasing farmer's income. This implies the increase of water and land productivity, under acceptable energy consumption and, as stressed above, a satisfactory equitable water distribution on collective network system. Periods of water scarcity are not avoided by gravity-fed conveyance systems supplied by surface water runoff, without upstream reservoirs to control the water available for irrigation during Summer. Such scarcity periods require specific water management practices, to optimize equity (Frisvold et al., 2018). To cope with the risks of lack of irrigation water, the management priorities are focused on off- and on-farm irrigation water saving and the downstream water reuse, namely by pumping from ditches, or a more effective use of soil water or groundwater by capillarity rising.

This contribution presents results of the Lis Valley Water Management Operational Group (RRN, 2020), integrated on the agricultural European Innovation Partnership (EIP-AGRI). The study aims at monitoring the collective supply network and the on-farm irrigation management, assessing the guidelines and procedures to carry out water savings, on a context of improving the rural development and environmental and economic sustainability.

Study area and methodologies

Lis Valley Irrigation District (LVID) has a gravity-fed conveyance system supplied by Lis river and its tributaries, recharged by water pumping from rivers and drainage ditches (Figure ❶). It is a public irrigation district